ACKNOWLEDGEMENT

The author wishes to express his gratitude to the Director of Fisheries, Gujarat State for the facilities offered during the investigation.

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*April* 19, 1970.

## 19. NOTES ON THE BIOMETRIC FEATURES OF *NEMIPTERUS JAPONICUS* (BLOCH)[1]

(*With two text-figures*)

### INTRODUCTION

Observations regarding the biometry and biology of *Nemipterus japonicus* from Indian waters are limited to the unpublished data of Amarnath (1961) and the Annual Reports of the Central Marine Fisheries Research Institute. This note deals mainly with some aspects of the biometry of the fish and its food.

At Porto Novo (*c.* 11° 29' N., 79° 49' E.), *N. japonicus* occurs in abundance from October to February but stray catches occur in other months also. According to the 1961 report of the Central Marine Fisheries Research Institute, the fish occurs in shoals off Tuticorin during August and September and is also caught in fairly large quantities at 27-31 m. depth off Cochin. *N. japonicus* has a wide distribution and has been recorded from the coastal waters of India, the Red Sea and from the east coast of Africa (Day 1878).

### MATERIAL AND METHODS

Since the fishery of *N. japonicus* at Porto Novo is seasonal, it was possible to get adequate samples only for a period of five months (October-February). The fish is generally caught in *Thoori valai* or bag nets, operated from catamarans. Samples were obtained from the main fish landing centres and also from the local fish market. Ninety specimens were examined. The usual methods were used for weight and length measurements and for analysis of stomach contents. Standard length of the fish was used as a basic prerequisite against which regression curves for other parameters were drawn. For estimating the length-weight relationship of the fish, only the total length of the fish was taken into consideration.

[1] This study formed a part of the dissertation submitted in partial fulfilment of the requirements for the degree of M.Sc., from the Annamalai University, 1965.

## Results and Discussion

*Body parts:* Details of the analysis of the data are presented in Tables 1, 2 and 3. The regression lines based on the degree of angle (*see* Table 3) are delineated in Fig. 1.

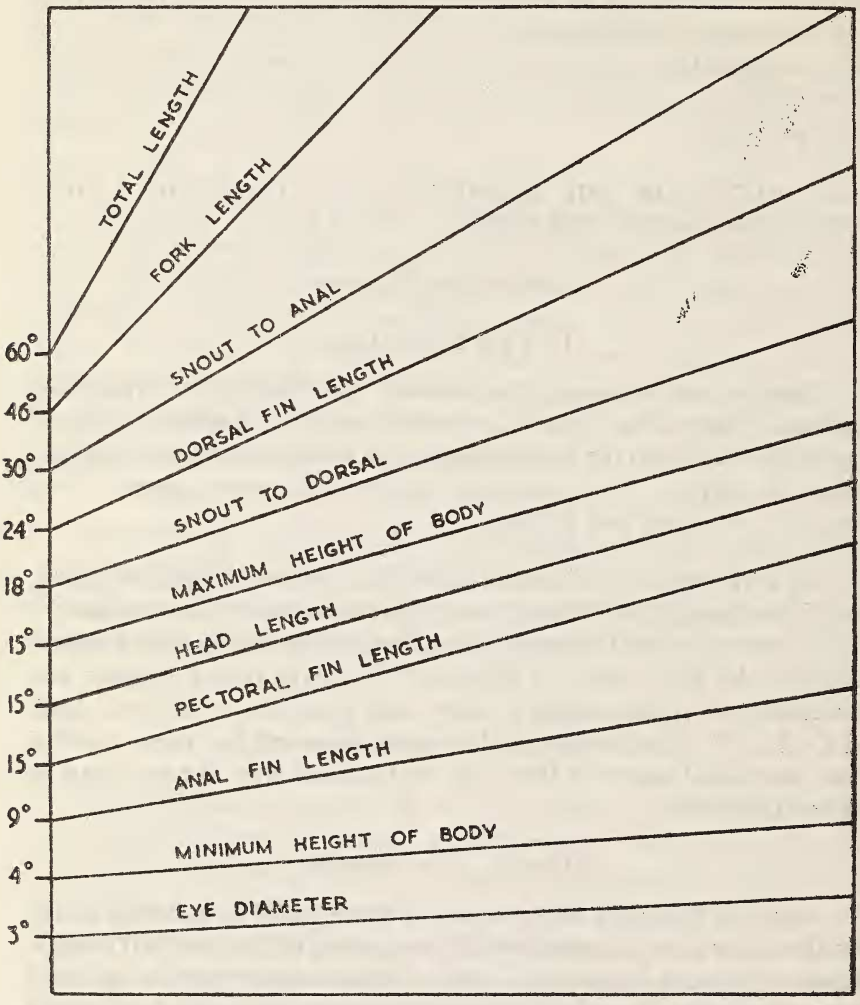


Fig. 1. Regressions of the different measurements of the body on standard length of *Nemipterus japonicus*.

A comparison of different regression lines in Fig. 1 reveals the relative growth of different parts of the body of *N. japonicus*. The regression studies indicate that the total length has a maximum rate of growth. This is followed by the fork length. A comparison of the relative growth of snout to dorsal with snout to anal length indicates that the latter grows

TABLE 1

MEAN VALUES OF DIFFERENT REGIONS OF BODY MEASUREMENTS IN *N. japonicus*

| Group No. | Class intervals in cm. | No. of specimens | Total body weight in gm. | Total length in cm. | Standard length in cm. | Fork length in cm. | Maximum height of body in cm. | Minimum height of body in cm. | Head length in cm. | Snout to dorsal in cm. | Snout to anal in cm. | Dorsal fin length in cm. | Pectoral fin length in cm. | Anal fin length in cm. | Eye diameter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.8– 6.8 | 4 | 3.5 | 6.1 | 4.9 | 5.7 | 1.5 | 0.6 | 1.5 | 1.9 | 3.0 | 2.5 | 1.4 | 0.8 | 0.7 |
| 2 | 6.9– 8.9 | 9 | 5.6 | 7.4 | 5.9 | 6.8 | 1.8 | 0.7 | 1.8 | 2.3 | 3.8 | 3.1 | 1.7 | 1.1 | 0.7 |
| 3 | 9.0–11.0 | 3 | 9.9 | 9.2 | 7.1 | 8.3 | 2.4 | 0.9 | 2.1 | 2.7 | 4.5 | 3.8 | 2.2 | 1.3 | 0.8 |
| 4 | 11.1–13.1 | 3 | 17.8 | 11.3 | 8.8 | 10.2 | 2.9 | 1.0 | 2.6 | 3.3 | 5.6 | 4.5 | 2.7 | 1.6 | 1.0 |
| 5 | 13.2–15.2 | 4 | 43.6 | 15.0 | 11.7 | 13.6 | 3.8 | 1.3 | 3.5 | 4.4 | 7.8 | 6.2 | 3.6 | 2.3 | 1.2 |
| 6 | 15.3–17.3 | 10 | 54.2 | 16.3 | 12.9 | 14.7 | 4.1 | 1.4 | 3.9 | 4.8 | 8.4 | 6.7 | 3.9 | 2.4 | 1.2 |
| 7 | 17.4–19.4 | 11 | 79.4 | 18.5 | 14.6 | 15.6 | 4.8 | 1.6 | 4.4 | 5.4 | 9.5 | 7.6 | 4.4 | 2.7 | 1.3 |
| 8 | 19.5–21.5 | 26 | 102.1 | 20.3 | 15.9 | 18.2 | 5.2 | 1.8 | 4.8 | 5.9 | 10.3 | 8.2 | 4.7 | 3.0 | 1.4 |
| 9 | 21.6–23.6 | 9 | 148.4 | 22.6 | 17.8 | 20.4 | 6.0 | 2.0 | 5.5 | 6.5 | 11.5 | 9.4 | 5.2 | 3.3 | 1.6 |
| 10 | 23.7–25.7 | 4 | 181.8 | 24.6 | 19.3 | 22.0 | 6.4 | 2.1 | 5.9 | 7.1 | 12.7 | 10.0 | 5.7 | 3.8 | 1.6 |
| 11 | 25.8–27.8 | 6 | 236.5 | 26.9 | 21.0 | 23.8 | 6.9 | 2.3 | 6.3 | 7.8 | 13.5 | 10.9 | 6.3 | 4.1 | 1.7 |
| 12 | 27.9–29.9 | 1 | 283.0 | 28.4 | 22.5 | 25.2 | 7.7 | 2.4 | 6.8 | 8.1 | 13.9 | 11.9 | 6.6 | 4.4 | 1.7 |

faster than the former. Similarly the relative growth of different fin lengths suggests that the dorsal fin grows faster than the other fins, namely the pectoral and the anal. The rate of growth of the dorsal fin falls in between those of the snout to anal and snout to dorsal.

TABLE 2

CONSOLIDATED DATA OF DIFFERENT REGIONS OF THE BODY OF THE FISH *N. japonicus* TOGETHER WITH OTHER STATISTICAL INFORMATION

| No. | Body regions | Standard length | | | | | |
|---|---|---|---|---|---|---|---|
| | | X | Y | XY | $X^2$ | a | b |
| 1 | Total length ... ... | 162.4 | 206.6 | 3,297.9 | 2,592.5 | —0.4 | 1.3 |
| 2 | Fork length ... ... | 162.4 | 185.5 | 2,951.8 | 2,592.5 | 0.6 | 1.1 |
| 3 | Max. height of body... | 162.4 | 53.5 | 859.1 | 2,592.5 | 0.4 | 0.3 |
| 4 | Min. height of body ... | 162.4 | 18.1 | 285.9 | 2,592.5 | 0.2 | 0.1 |
| 5 | Head length ... ... | 162.4 | 48.9 | 784.7 | 2,592.5 | 0.02 | 0.3 |
| 6 | Snout—dorsal ... | 162.4 | 60.2 | 955.9 | 2,592.5 | —0.4 | 0.4 |
| 7 | Snout—anal ... ... | 162.4 | 104.5 | 1,666.5 | 2,592.5 | 0.6 | 0.6 |
| 8 | Dorsal length ... | 162.4 | 84.8 | 1,354.4 | 2,592.5 | 0.3 | 0.5 |
| 9 | Pectoral length ... | 162.4 | 48.4 | 771.0 | 2,592.5 | —0.03 | 0.3 |
| 10 | Anal length ... ... | 162.4 | 30.8 | 495.9 | 2,592.5 | —0.1 | 0.2 |
| 11 | Eye diameter ... | 162.4 | 14.9 | 226.1 | 2,592.5 | 0.4 | 0.06 |

TABLE 3

TANGENT VALUES OF DIFFERENT BODY REGIONS

| No. | Body regions | 'b' value | Angle | Tangents |
|---|---|---|---|---|
| 1 | Standard length—Total length ... | 1.3 | 60° | 1.7321 |
| 2 | Standard length—Fork length ... | 1.1 | 46° | 1.0355 |
| 3 | Snout to anal fin ... ... ... | 0.6 | 30° | 0.5774 |
| 4 | Dorsal fin length ... ... ... | 0.5 | 24° | 0.4452 |
| 5 | Snout to dorsal fin ... ... ... | 0.4 | 18° | 0.3249 |
| 6 | Maximum height of body ... ... | 0.3 | 15° | 0.2679 |
| 7 | Head length ... ... ... ... | 0.3 | 15° | 0.2679 |
| 8 | Pectoral fin length ... ... ... | 0.3 | 15° | 0.2679 |
| 9 | Anal fin length ... ... ... | 0.2 | 9° | 0.1584 |
| 10 | Minimum height of body ... ... | 0.1 | 4° | 0.0699 |
| 11 | Eye diameter ... ... ... ... | 0.06 | 3° | 0.0524 |

The data also show that the relative rate of growth, delineated from the regression line angle, is similar for the pectoral fin length, the maximum height of the body and for the head length of the fish. The slowest growing body part, however, is the diameter of the eye while next to it is the minimum height of the body which is one degree faster in its growth than that of the diameter of the orbit.

*Length-weight Relation :* The point of inflation of the curve showing diminution of condition factor with increasing length has been thought to be an indicator of the length at which sexual maturity is attained in fish (Hart 1946). In the present study the modified emperical relationship

of $W=CL^n$ (Le Cren 1951) was used where W is the weight of fish, L is the length of fish and C and n are constants to be determined empirically.

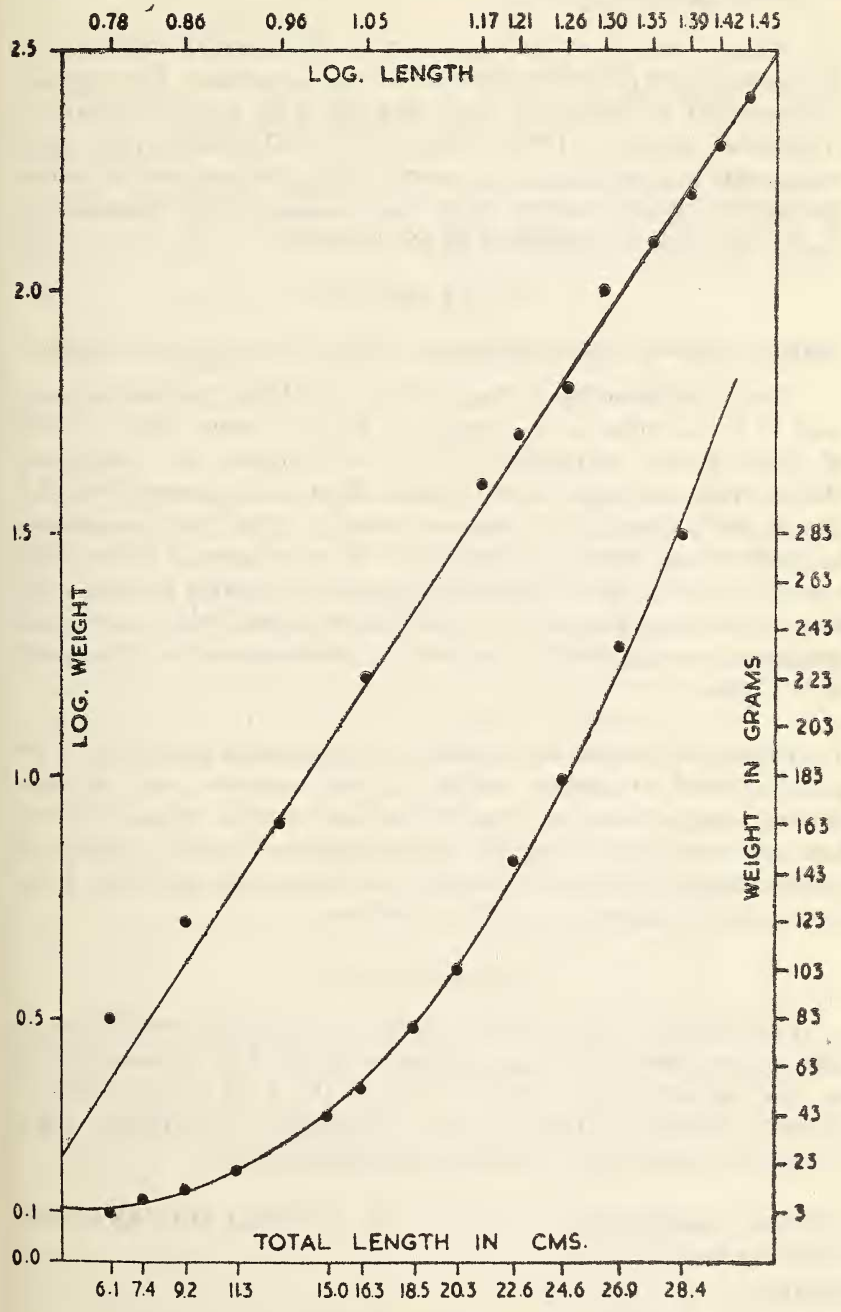


Fig. 2. Length-weight relationship and the logarithmic transformation of length and weight values in *Nemipterus japonicus*.

The data of length-weight relationship are presented in Fig. 2 together with their logarithmic values.

It can be seen from the Fig. 2 that the length-weight relationship in *N. japonicus* is of non-linear type and formed a parabola. The regression of log length on log weight was observed to be linear. Similarly for *Nemipterus virgatus*, Li (1954) reported $W=0.022L^3$ and found a linear relationship for the length range sampled, while the relationship between the observed weight and the length was non-linear. The relationship in *N. japonicus* is best represented by the equation :

$$W=(-2.085)\ L^{3.092}$$

thereby indicating that weight increases at the rate of cube of the length.

*Food:* Basheeruddin & Nayar (1961) found that the main items of food of the juveniles of *N. japonicus* in Madras waters, chiefly consists of prawn larvae, stomotopod larvae, few copepods and amphipods. Similar studies on the gut content of adults from Cochin waters (CM.F.R.I. Report 1961) show that the main components of the food were prawns and polychaetes, including *Squilla* sp. in large numbers. Chacko (1949) reported that the fish is a plankton feeder but very often browses at the bottom and amongst seaweeds. Li (1954) observed small teleosts, decapods, cephalopods and annelids in that order of abundance in the gut contents of *N. virgatus*.

During the present observation on *N. japonicus* a major part of the gut was found to contain bottom dwelling organisms such as polychaetes, small prawns, fragments of molluscan shells, pieces of hermit crab and occasionally copepods and amphipods. It can, therefore, be concluded that *N. japonicus* is largely a carnivorous fish and feeds at the bottom and occasionally on surface plankton.

ACKNOWLEDGEMENTS

I am grateful to Professor R. V. Seshaiya, Director, Marine Biological Station, Porto Novo for suggesting the problem and for guidance during the work. Grateful thanks are also due to Dr. S. Z. Qasim, Scientist, National Institute of Oceanography, Ernakulam, for critically going through the manuscript and making valuable suggestions.

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*January* 24, 1970.

REFERENCES

AMARNATH, D. (1961): A study of the Biology, biometry and fishery of *Nemipterus japonicus* (Block). M.Sc. thesis, Annamalai University, (Unpublished).

BASHEERUDDIN, S. & NAYAR, K. N. (1961): A preliminary study of the fishes of the coastal waters off Madras city. *Indian J. Fish.* 8: 169-188.

CENTRAL MARINE FISHERIES RESEARCH INSTT. (1961): Annual Report of the Director for the year ending 31st March 1961. *Indian J. Fish.* 8.

HART, T. J. (1946): Report on trawling surveys on Patagonian continental shelf '*Discovery*'. Rep. 23: 223-224.

LE CREN, E. D. (1951): The length-weight relationship and seasonal cycle in gonad weight and condition in the Perch (*Perca fluviatilis*). *J. Anim. Ecol.* 20: 201-219.

LI, KWAN-MING (1954): An Account of the Golden Thread Group Fishery in Hong Kong, and a Preliminary Note on the Biology of *Nemipterus virgatus* (Houttyun). *Hong Kong Univ. Fisheries Journal* 1: 1-18.

## 20. A NOTE ON THE TAXONOMY OF A SPECIES OF *TACHYSURUS* LACÉPÈDE (PISCES: TACHYSURIDAE)

(*With a text-figure*)

During a study of the shore fishes of Goa, a specimen of *Tachysurus* Lacépède collected by Dr. S. W. Kemp from Mormugoa Bay in September 1916 was tentatively determined as *T. jatius* (Hamilton 1822). A perusal of the pertinent literature, however, clearly indicates that two species have been confused under the name *jatius* Hamilton. The first species has an edentulous palate and this is clearly the fish named by Hamilton (1822) and later figured by Day (1877, pl. 56, fig. 4) and redescribed by Misra (1959) under the genus *Hemipimelodus* Bleeker. The other related species has two small oval patches of granular palatal teeth and this has up to now apparently been confused by Ichthyologists (Blyth 1860; Day 1877; Munro 1955) with, and accepted as *jatius* Hamilton. This species is described below and is most probably a new species of *Tachysurus* and not congeneric with Hamilton's *jatius*. A new name for this species of *Tachysurus* is not, however, being proposed for the present in view of the limited material available for study.

The type species of the genus *Tachysurus* Lacépède, 1803 is *Tachysurus sinensis* Lacépède which has teeth on the palate; *Pimelodus borneensis* Bleeker, the type species of *Hemipimelodus* Bleeker, 1858, has, however, an edentulous palate. This is the chief taxonomic character for differentiating the two genera (*vide* Weber & de Beaufort 1913; Fowler 1941; Smith 1945; and Misra 1959).

In the collections of the Zoological Survey of India Day's (1877) figured example of *Arius jatius* (Hamilton) corresponding to Plate 56, Fig. 4 (Reg. No. Cat. 473) and another specimen of *A. jatius* (Reg. No. F 13460/1) with an edentulous palate, are available for comparison. Unfortunately, no specimen of Day's *Arius jatius* with palatal teeth are